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for "civil aviation, experiments and research" will be welcome news to those who hope for the scientific development of commercial flying. General Seely further points out that this sum does not by any means represent the total amount that will be spent on research beneficial to the civilian aviator, since the results of experiments carried out for military purposes and paid for out of the Army Estimates will be equally available for the improvement of commercial machines.

The government has decided that it can not itself undertake commercial flying, but that it will do everything in its power to give encouragement and protection, and it is already announced that the Postmaster-General is prepared to give contracts to private firms which are able to offer approved machines for postal services. Moreover, the government will place most of the military aerodromes of the country at the disposal of civilian pilots for a small fee, and this alone should do much to encourage civilian flying.

In the course of his speech General Seely announced that an important invention in wireless telephony had recently been made, by means of which the wireless operator in an aeroplane was able both to send and to receive messages. It was possible during the war for the leader of a scouting aeroplane squadron to communicate with the others, but it was not practicable to receive an answer. A vacuum valve generator was employed to generate smooth oscillations in the hanging aerial, and a vacuum valve magnifier with a crystal rectifier was used as the receiver. The experimental apparatus was in use in pre-war days, but it required years of research to make it practical and trustworthy.—*Nature*.

SCIENTIFIC BOOKS

The Place of Description, Definition and Classification in Philosophical Biology. By PROFESSOR WILLIAM E. RITTER, in "The Higher Usefulness of Science and other Essays" (4th essay). Richard G. Badger. 1918, Pp. 105-136.

Few of those who have sometimes harbored mild inward protests against the expansions

of subjective biology implied in the organization and interpretation of many of the experimental researches of the day realize the cogency of their unexpressed protests. That accurate thinking regarding biological fundamentals is of first importance for the proper direction and development of biology, science and even of civilization itself is suggested by Professor Ritter in a significant article which has not received nearly the attention it deserves.

Summarily stated Professor Ritter's thesis is as follows: Taxonomy has by many been set aside "as marking a juvenile period in the life of biology"; this appraisal of taxonomy involves a monstrous fallacy; the dominance of individual scientists animated by this mistaken attitude toward systematic zoology and botany has led to unfortunate consequences, both in the development of science and in that of civilization itself.

In science it has given rise to a state of affairs in which the experimental method has been raised to the high place of an end in itself, and has apparently been the stimulus to an extreme of speculation which is perhaps best exemplified by the theoretical conceptions of the German Weismann. In philosophy it has led to the doctrine of the superman, best exemplified in the writings of the German Nietzsche.

On the basis of the assertion that "taxonomic research in both zoology and botany has for years, so far as it has been based on morphology exclusively, taken as one of its guiding principles *neglect nothing*," Professor Ritter goes on to suggest that we can no longer properly restrict our dictum of "neglect nothing" to morphological attributes alone, "but must extend it to all attributes of organisms whatever—morphological, physiological, ecological, chemical and all the rest." He is of the opinion that a comprehensive review of the whole range of biological results won during the last twenty-five years indicates that each of the main provinces of research "contain differentia corresponding to the systems of classification previously established on the

basis of pure morphology," and says: "No biological phenomenon is adequately interpreted or dealt with experimentally, until it has been considered with reference to the place which the organisms to which it pertains hold in the system of classification." That is, no generalization about the reaction of a species to light, or its chromosomal characters for example, can be accepted as fully valid until compared with the reaction to light or the chromosomal characters of all the other species of the genus, etc. All biologists with extensive field experience will have been struck with the "individualness" in many respects of the distribution, behavior and habit of the different species studied. "Each kind of organism has a chemistry to some extent unique," says Professor Ritter. The same appears to be true of its behavior, ecology, physiology, distribution. Yet nothing is more common, in the literature of present day biology, than generalization for the entire animal kingdom (sometimes even including man), on the basis of the experimental study of a single organism, perhaps among the Protozoa, Insecta or Aves!

Dr. Ritter calls attention to a fact which seems to have been missed by not a few biologists particularly in the fields of cytology and biochemistry, namely, that work in the "analysis" or "causal analysis" of organisms, in so far as the work really has an objective basis, is nothing more than a part of the description of the organism. In other words, analysis and explanation are only species of the genus description. "The sooner it is borne in upon the minds of all students of living beings, no matter with what aspects of such beings they may be occupied, that they are engaged in the great task of describing and classifying the living world; and, so far as 'pure biology' is concerned, are doing nothing else, the sooner will objective biology get itself set off from subjective biology and the sooner will philosophical biology become purged of the many morbid growths which now impair its health and mar its beauty."

"Never more than in the present day," says Professor Ritter, "when experimental research

has found so wide and lasting, and, on the whole, beneficent a hold in biology has there been need of fidelity to description and classification." The emphasis is not so much on the shortcoming or even the incompleteness of the experimental method as on the great need for researches which shall inform us as to the "normal behavior of normal organisms under normal conditions."

Probably few would be willing at this stage of scientific development to go all the way with Professor Ritter in his apparently thoroughgoing skepticism regarding some of the popular biological concepts of the day, *e. g.*, those of the "germ plasm" and the "fit"; and it is quite certain that his implication of a lack of regard for and appreciation of the orderliness and unity of living nature on the part of the dominant school of biologists of the day is not wholly justified; but the note of warning he sounds as to the tendency "to neglect everything except the one or a very few things which the experimenter must of necessity make the object of each special piece of work" is one which deserves emphasis.

There are signs of a growing realization on the part of scientific men that recent tendencies to minimize the importance of description and classification in biology are unhealthful; and that with this realization is associated a tendency to utilize in greater measure the natural history mode of philosophizing of which Professor Ritter speaks and which he so highly recommends.

The war has taught scientific men, philosophers and people generally, the overwhelming necessity for right thinking about life and living, if we are to avoid additional cataclysms in the future.

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SPECIAL ARTICLES

TO CUT OFF LARGE TUBES OF PYREX GLASS

ON a number of occasions I have heard the remark from instructors in physics and chemistry, who do most of their own glass blowing, that they are unable to "cut" off squarely